MILITARY STANDARDIZATION HANDBOOK

MICRO-REPRODUCTION OF ENGINEERING DOCUMENTS

To all holders of MIL-HDBK-303

1. The following pages of MIL-HDBK-303 have been revised and supersede the pages listed:

New Pages	Date	Superseded Page	Date
1, 2, 2a	15 March 1971	1, 2	15 Sept 1964
17, 18, 18a	15 March 1971	17, 18	15 Sept 1964

Note: On all revised pages, changed portions of the text are indicated by vertical lines in the left margin.

2. Make the following changes:

a. Page 3, paragraph 5.1, second line. Add "ments." at the beginning of the line.

b. Page 3, paragraph 5.1, tenth line. Change "D-70327" to "D-1000".

c. Page 5, paragraph 5.4.2, subparagraph e. Change "Figure 11" to "Figure 12".

d. Page 6, paragraph 5.4.2.1, subparagraph c. Change "Parallelisb" to "Parallelism" and change "bracked" to "bracket".

e. Page 6, paragraph 5.5.1.2, seventeenth line. Change "Figure 11" to "Figure 12".

f. Page 10, paragraph 5.7, sixth line. Change "MIL-C-9878" to "MIL-M-38761".

1. SCOPE

1.1 Purpose. The purpose of this handbook is to provide guidance for Departments and Agencies of the Department of Defense and their contractors in the techniques required to obtain satisfactory micro-reproductions of engineering documents.

1.2 Scope. This handbook contains information regarding preparation and reproduction processes, practices and techniques which affect the quality, legibility, permanence and the interchange capabilities between military activities of all engineering documents in the form of microfilms or photographs and the reproductions thereof.

2. REFERENCED DOCUMENTS

2.1 The current issues of the following documents form a part of this handbook with regards to information on the preparation and micro-reproduction of drawings, lists, specifications and other related engineering documents.

SPECIFICATIONS

Military

MIL-D-1000	Drawings, Engineering and Associated Lists
MIL-M-9868	Microfilming of Engineering Documents, 35MM, Requirements for:
MIL-C-9877	Cards, Aperture.
MIL-P-9879	Photographing of Construction/ Architectural Drawings, Maps and Related Documents, 105mm; Requirements for.
MIL-C-9949	Cards, Copy.
MIL-M-38761	Microfilming and Photographing of Engineering/Technical Data and Related Documents: PCAM Card Preparation, Engineering Data Micro-Reproduction System, General Requirements for, Preparation of.

STANDARDS

MIL-STD-100	Engineering Drawing Practices

MIL-STD-804	Formats and Coding of Aperture, Copy and Tabulating Cards for Engineering Data Micro-Reproduction System.

HANDBOOKS

MIL-HDBK-25	Glossary of Photographic Terms Including Document Reproduction.

3. DEFINITIONS

3.1 Aperture Card. An aperture card is a tabulating card with a rectangular hole specifically prepared for the mounting or insertion of a frame of microfilm.

3.2 Control Activity. The control activity is the Department of Defense activity that holds the processed camera microfilm image of the document. It is responsible for answering requests from other Department of Defense activities for copies of the microfilm image.

3.3 Data Field. A data field consists of one or more columns on an aperture, copy or tabulating card, reserved for specific information entered in a specified manner.

3.4 Engineering Data Micro-Reproduction System (EDMS). The EDMS is a Department of Defense (DOD) Program established to standardize and implement a common micro-reproduction system to be used throughout the Army, Navy, Air Force and industrial suppliers to DOD in the preparation of 35mm microfilm and 105mm film copies of engineering documents, preparation of tabulating and aperture cards, and the mounting of frames of 35mm microfilm in aperture cards.

3.5 Engineering Documents. "Engineering Documents" are specifications, drawings, sketches, lists, standards, pamphlets, reports and printed, typewritten, or other design, procurement, manufacture, test or inspection of items or services.

3.6 Frame. The frame is the total area of microfilm utilized in one exposure, regardless of whether or not the area is filled by the document image.

3.7 First Reproduction Microfilm. First reproduction microfilm is made from the camera microfilm.

3.8 Second Reproduction Microfilm. Second reproduction microfilm is made from first reproduction microfilm.

3.9 Single Frame Microfilming. Single frame microfilming is the utilization of one frame of microfilm to depict a single sheet of

an engineering drawing or up to four sheets or pages of a complete engineering document.

3.10 Multiple Frame Microfilming. Multiple frame microfilming is the utilization of two or more frames of microfilm to depict a single sheet(s) or page(s) of an engineering document.

3.11 Reduction Ratio. The term Reduction Ratio means the ratio of the linear measurement of a document to the linear measurement of the micro-image of that same document. This ratio is expressed in abbreviated form as 16X, 24X, etc.

3.12 Revised. The term "revised" code-punched in a tabulating or aperture card means that there is a more recent issue of the document than shown in the original card.

3.13 Revision Notice. A revision notice is a separate document that describes a change to an engineering drawing in accordance with Standard MIL-STD-100.

3.14 Tabulating Card. A tabulating card is a card on which data are entered by use of punched holes or other means that can be sensed by a machine so that it can sort, collate, list, total, or otherwise manipulate the card or the data. Tabulating cards are used as a work deck to reproduce punch aperture and copy cards (see 5.7.3).

3.15 Other Definitions. Other definitions relating to engineering document preparation and reproduction are included in such documents as MIL-STD-100, MIL-D-1000, MIL-HDBK-25.

4. GENERAL INFORMATION

4.1 Establishment of the Engineering Data Micro-Reproduction System (EDMS). The Department of Defense Engineering Data Micro-Reproduction System (EDMS) is a program established for the microfilming, photographing, and recording of research, development and design information, including engineering and construction drawings, associated lists, specifications and related documents. Whether this program results in good products and contributes significantly to the working efficiency of the military departments and industry, depends largely upon the drafting effort, document preparation and Punched Card Accounting Machine (PCAM) services of military and industry.

Viewer. This is a projection viewer accommodating 105mm negatives. It projects an 8 times image of the information contained in the negative onto a plate glass surface (covered with translucent material) which forms the top of the drafting table viewer. The unit consists of a drafting-type table with projector attached parallel to the right end of the table. The projector unit may be removed from the table and used for wall screen projection film. Projection lamps between 750 and 1000 watts may be used in the unit. The film holder can rotate 360°. At the left side of the table is a compartment to hold a roll of tracing paper.

5.8.9 4X 105mm Viewer-Printer. This 105mm viewer-printer is a compact, efficient unit which will project or print from 105mm negatives at 4X magnification. The 16" x 24" viewing screen is recessed in a frame for good visual contrast and provides crisp, clear images. Prints made on this viewer-printer are excellent for reference purposes. The viewer-printer fits conveniently on any table or stand of appropriate size. A stand is also available as an optional accessory. No darkroom is necessary. The basic features of this model are:

a. The film holder facilitates quick, accurate positioning of the negative and slips easily into the machine. The holder is simple to clean and may be completely removed from the machine. An extra film holder is provided to assist in speedy loading and changing. A take-up magazine that attached quickly to the right sides of the unit can be obtained as an accessory item. When multiple frames are to be viewed they can be collected automatically in this magazine, which holds five negatives in a holder.

b. A "paper-safe" compartment at the top of the viewer-printer offers safe, convenient storage space for the sensitized paper sheets.

c. Sensitized paper can be taken from the "paper-safe" compartment and quickly loaded from the top between glass pressure plates at the viewing plane. After setting the timer, a push-button control exposes the paper, which is then ready for processing in a single solution print processor.

d. A sectionalized carrier shelf, directly below the viewing screen provides space within easy reach for extra negatives and film holders.

5.8.10 3X 105mm Viewer-Printer. This 105mm viewer-printer is a compact efficient unit which projects or prints from 105mm negatives at 3X magnification. The projected image can either be viewed or quick, sharp, reference prints may be made. The basic features of this unit are:

a. Ease of Film Loading. The film holding mechanism consists of a sheet or optically clear plexiglass, which when pulled

forward allows the 105mm film to be easily dropped into place. No separate film holder need be loaded and there is no critical positioning of the film in the built-in holder. SIMPLIFIED FILM LOADING is accomplished by merely pulling the plexiglass plate forward and dropping the 105mm negative into the holder.

b. Sharp, Brilliant Image. Because the image is projected directly to an opaque viewing surface, the resultant image is extremely bright and clear. Thus, this unit may be readily used in areas with a high level of illumination, such as drafting room...and the image is still brilliant and clear.

c. Convenient Placement. The unit is compact in size and when not in use may be swung out of the projecting position to increase space usage. The surface required is only 20" x 30".

d. Print Quality and Operation. The optics of this unit have been especially designed to provide crisp, needle-sharp prints regardless of the most common adverse lighting conditions. Printing time may vary slightly from 5 to 15 seconds due to negative density and ambient light. In the printing operation, the No. 650 One Solution Paper merely lays flat on the viewing surface - minor curling of the paper will not adversely affect print quality. Exposure time is easily controlled by on-off toggle switch. (An accessory timer can be factory-installed at additional cost.)

e. Optinal Enlargement. The basic unit, as indicated by the specified dimensions shown, will provide an enlargement of 3 times. On special quantity orders, an enlargement ratio of 4 times can be provided at additional cost.

5.8.11 Print Processor. This unit is used with the 4X viewer-printer to process reference prints exposed on that printer from 105mm film. The print processor used one solution to develop and stabilize the print image. The paper may be processed in subdued light - no darkroom is required. This processor has a 27" throat and will readily accept the 16" x 24" prints exposed on the viewer-printer. The paper is fed into the front opening until it engages two motor driven squeegee rollers which transport the print through the processing solution and squeegee the print dry.

5.9 Preservation, Packaging and Marking. The applicable preservation, packaging and marking requirements for all 35mm microfilm, 105mm film and aperture, copy and tabulating cards are contained in Section 5 of the following specifications:

5.9.1 Specification MIL-M-9868 for 35mm microfilm.

5.9.2 Specification MIL-C-9879 for 105mm film.

5.9.3 Specification MIL-C-9877 for aperture cards.

5.9.4 Specification MIL-C-9949 for copy cards.

5.9.5 Specification MIL-M-38761 for tabulating cards.

Custodians:

Army - MI

Navy - SH

Air Force - 26

Reviewer:

Army - EL; MU; MI

Navy - YD; SH; CG; OS

User:

Navy - MC

Preparing Activity:

Air Force - 26

Project No. EDMS 0059